

CLAIMS:

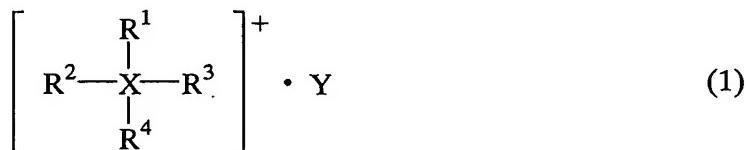
1. A nonaqueous electrolyte characterized by containing:
an ionic liquid which has general formula (1) below and is
5 liquid at not higher than 50° C



wherein R¹ to R⁴ are each independently an alkyl group of 1
to 5 carbons or an alkoxyalkyl group of the formula
R'-O-(CH₂)_n- (R' being methyl or ethyl, and the letter n
10 being an integer from 1 to 4), and any two from among R¹, R²,
R³ and R⁴ may together form a ring, with the proviso that at
least one of R¹ to R⁴ is an alkoxyalkyl group of the above
formula,

X is a nitrogen atom or a phosphorus atom, and
15 Y is a monovalent anion; and
an ion-conductive polymer.

2. A nonaqueous electrolyte which is characterized in
that it is obtained by curing a composition containing:
20 an ionic liquid which has general formula (1) below and is
liquid at not higher than 50° C



wherein R¹ to R⁴ are each independently an alkyl group of 1
to 5 carbons or an alkoxyalkyl group of the formula
25 R'-O-(CH₂)_n- (R' being methyl or ethyl, and the letter n
being an integer from 1 to 4), and any two from among R¹, R²,
R³ and R⁴ may together form a ring, with the proviso that at
least one of R¹ to R⁴ is an alkoxyalkyl group of the above
formula,

X is a nitrogen atom or a phosphorus atom, and
Y is a monovalent anion;
a compound having a reactive double bond on the
molecule; and

5 an ion-conductive polymer.

3. The nonaqueous electrolyte of claim 1 or 2 which is
characterized by containing a lithium salt.

10 4. The nonaqueous electrolyte of claim 3 which is
characterized in that the lithium salt is LiBF₄, LiPF₆,
Li(CF₃SO₂)₂N, LiCF₃SO₃ or LiCF₃CO₂.

15 5. The nonaqueous electrolyte of any one of claims 1 to 4
which is characterized in that the ion-conductive polymer is
a noncrystalline polymer.

20 6. The nonaqueous electrolyte of any one of claims 1 to 5
which is characterized in that the ion-conductive polymer has
a relative permittivity at 25°C and 1 MHz of 5 to 50.

25 7. The nonaqueous electrolyte of any one of claims 1 to 6
which is characterized in that the ion-conductive polymer is
a thermoplastic polyurethane resin.

8. The nonaqueous electrolyte of any one of claims 1 to 6
which is characterized in that the ion-conductive polymer is
a hydroxyalkyl polysaccharide or a hydroxyalkyl
polysaccharide derivative.

30 9. The nonaqueous electrolyte of any one of claims 1 to 6
which is characterized in that the ion-conductive polymer is
a polymeric compound having an average degree of
polymerization of at least 20 and containing polyvinyl
35 alcohol groups of general formula (2) below



wherein n is a number from 20 to 10,000, some or all of the hydroxyl groups on the polyvinyl alcohol units being substituted with oxyalkylene-bearing units having an average molar substitution of at least 0.3.

5

10. The nonaqueous electrolyte of any one of claims 1 to 6 which is characterized in that the ion-conductive polymer is a polymeric compound having an average degree of polymerization of at least 20 and containing polyvinyl

10 alcohol units of general formula (2) below



wherein n is a number from 20 to 10,000, some or all of the hydroxyl groups on the polyvinyl alcohol units being substituted with cyano-substituted monovalent hydrocarbon groups.

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11. The nonaqueous electrolyte of any one of claims 1 to 6 which is characterized in that the ion-conductive polymer is a polymeric compound having units of formula (3) and units of 20 formula (4)



wherein at least 10% of the end groups on the molecular chain are capped with one or more groups selected from among halogen atoms, substituted or unsubstituted monovalent

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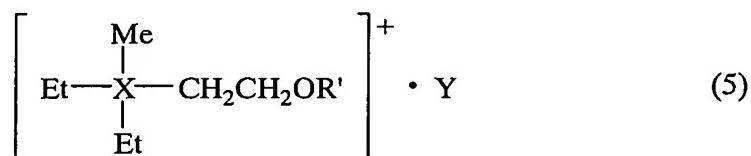
hydrocarbon groups, R⁵CO- groups (R⁵ being a substituted or unsubstituted monovalent hydrocarbon group), R⁵Si,- groups (R⁵ being the same as above), amino groups, alkylamino groups, H(OR⁶)_m- groups (R⁶ being an alkylene group of 2 to 4 carbons,

and m being an integer from 1 to 100) and phosphorus atom-containing groups.

12. The nonaqueous electrolyte of any one of claims 1 to
5 which is characterized in that the ionic liquid is liquid
at not higher than 25°C.

13. The nonaqueous electrolyte of any one of claims 1 to
12 which is characterized in that X is a nitrogen atom, R' is
10 methyl, and n is 2.

14. The nonaqueous electrolyte of any one of claims 1 to
12 which is characterized in that the ionic liquid has
general formula (5) below



15 wherein R' is methyl or ethyl, X is a nitrogen atom or a phosphorus atom, Y is a monovalent anion, Me stands for methyl and Et stands for ethyl.

20 15. The nonaqueous electrolyte of any one of claims 1 to
14 which is characterized in that Y is BF_4^- , PF_6^- , $(\text{CF}_3\text{SO}_2)_2\text{N}^-$,
 CF_3SO_3^- or CF_3CO_2^- .

25 16. An electrical double-layer capacitor comprising a pair of polarizable electrodes, a separator between the polarizable electrodes and a nonaqueous electrolyte,

which electrical double-layer capacitor is characterized in that the nonaqueous electrolyte is a nonaqueous electrolyte according to any one of claims 1 to 15.

30 17. A nonaqueous electrolyte secondary cell comprising a positive electrode which contains a lithium-containing double oxide, a negative electrode which contains a carbonaceous

material capable of lithium ion insertion and extraction or contains metallic lithium, a separator between the positive and negative electrodes, and a nonaqueous electrolyte;

which nonaqueous secondary cell is characterized in
5 that the nonaqueous electrolyte is a nonaqueous electrolyte according to any one of claims 1 to 15.